Direction Leaflet Number Four

HOW TO MOUNT AND LABEL HARD-BODIED INSECTS

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The value of a collection of insects depends largely upon the care with which it has been mounted and labeled. A successful system of mounting must preserve the insects in such a way that they can be handled and viewed from all sides without breaking, and must keep associated with each specimen all the information which the collector may have about it. Indeed, without data, any collection of insects, however perfectly mounted, is valueless for scientific puropses. Any orderly method of keeping a collection which satisfies the basic requirements is acceptable. The one here described is that now used by most advanced amateur and professional entomologists for dealing with hard-bodied forms.

TOOLS AND MATERIALS

The tools and materials which you will need for mounting your collection are few but essential. They include:

1. Insect Pins.

Since most hard-bodied insects are preserved simply by drying and, when dry, are extremely brittle, they are usually impaled upon special insect pins, as shown in fig. 1. The pins serve both as convenient

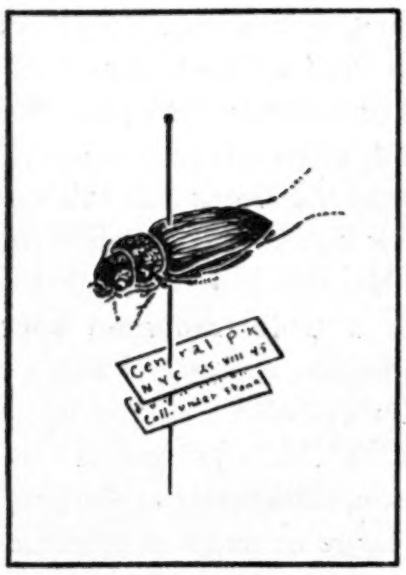

Fig. 1. The accepted scientific method of mounting hard-bodied insects.

handles and as a means of securing the specimens in the storage boxes. They are made of steel, an inch and a half long and of various thicknesses. The diameter is designated by a number, the higher the number the thicker the pin. Most insects commonly taken by beginners can be pinned on number threes. Number fives are good for the largest species, while a specimen too small for a number one is too small for simple pinning and must have special treatment. Insect pins are sold, in lots of one-or five hundred, by scientific supply houses, which can be found in the classified telephone books of most large cities. If there are none closer to you, you will find the following firms good sources of entomological equipment: Wards Natural Science Est., P. O. Box 24, Beechwood Station, Rochester, New York; General Scientific Supply House, Inc., 761 East 69th Place, Chicago, Illinois.

2. Forceps.

Many insects are too small to handle without the aid of tweezers or forceps. You will have to have at least one pair, slender, pointed, and straight or curved at the tip, according to preference. For butterflies and moths you may want a broad-ended, smooth-faced stamp forceps and, though not absolutely necessary, a heavy, curved, rough-faced pin forceps will be very useful. All may be obtained at the same place that you get your pins.

3. Scissors. Small and sharp.

4. Paper.

Stiff, hard surfaced, white, and about as thick as a visiting card. This will be used to make pin labels and points for mounting very small insects.

5. Pen and Ink.

The pen should have the finest available point. The kind called "Crowquill" is very good. Black waterproof India ink will make the clearest and most durable labels.

6. Glue.

This is used to fasten small insects to points, and to repair broken specimens. True glue, water soluble and slow setting, can be used at need; but it will not stick to oily specimens and in hot and humid weather tends to soften and "come unstuck." White shellac diluted with alcohol was, for a long time, the best available adhesive. It sets in a moderately short time

and clings tenaciously even to waxy species. Duco, or some similar clear plastic cement, is now preferred by many collectors, as it sets rapidly and is almost invisible. It must, however, be thinned with acetone or a thinner provided by the maker. The minute quantity of cement needed for entomological mending would, otherwise, become dry at the surface before the pieces to be joined could be brought into position. Plastic cements will not hold if the specimen is wet or oily, and in difficult cases shellac may be the only alternative. Whatever adhesive you prefer, keep it always at hand in a non-tip bottle with a tight stopper and needle applicator. A drawing ink bottle is readily adaptable to this purpose. One so used is shown in fig. 2.

7. A small camel's hair brush.

If you have to buy this new, get a number-one round water-color brush. You will find it very useful for picking up pieces too delicate to handle even with forceps. It is only necessary to moisten the brush with water or alcohol and touch it to the fragment. A small drop of adhesive is applied at the proper spot on the insect, the detached piece placed against it and held for a few seconds, and the brush withdrawn. In stubborn cases it may help to put a little glue on the fragment as well as on the specimen before joining them.

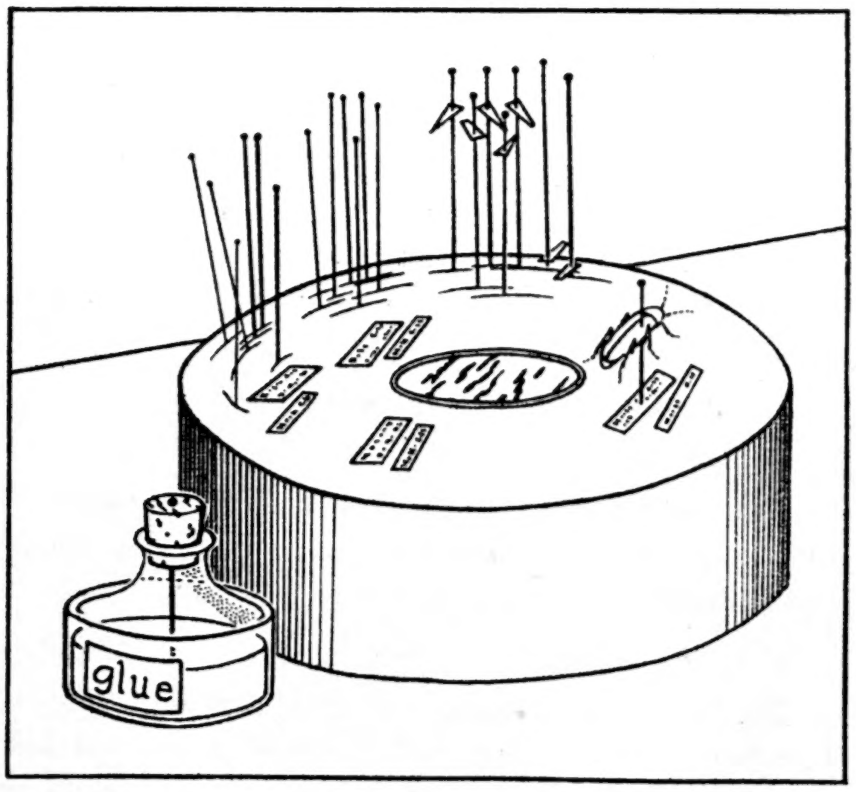

Fig. 2. A pinning block and glue bottle.

8. A pinning block.

This is a piece of some penetrable substance upon which the specimen or label may be placed while the pin is driven through it. A piece of balsa wood, cut across the grain, does very well. An inch thick slice sawed from a roll of toilet paper, bound around the outside with adhesive tape or gummed paper, and plugged in the middle with a tight cork to keep it firm, will also give good service. Fig. 2 illustrates this kind of block. If the upper surface of the pinning block is not flat and smooth, sandpapering will soon make it so. When mounting a large lot of insects, particularly if many of them require individual setting to arrange the appendages, you may have need of several pinning blocks at one time. A sheet of cork or thin balsa wood plank about the size of a sheet of letter paper is also useful, especially when point-mounting some kinds of small insects as described below.

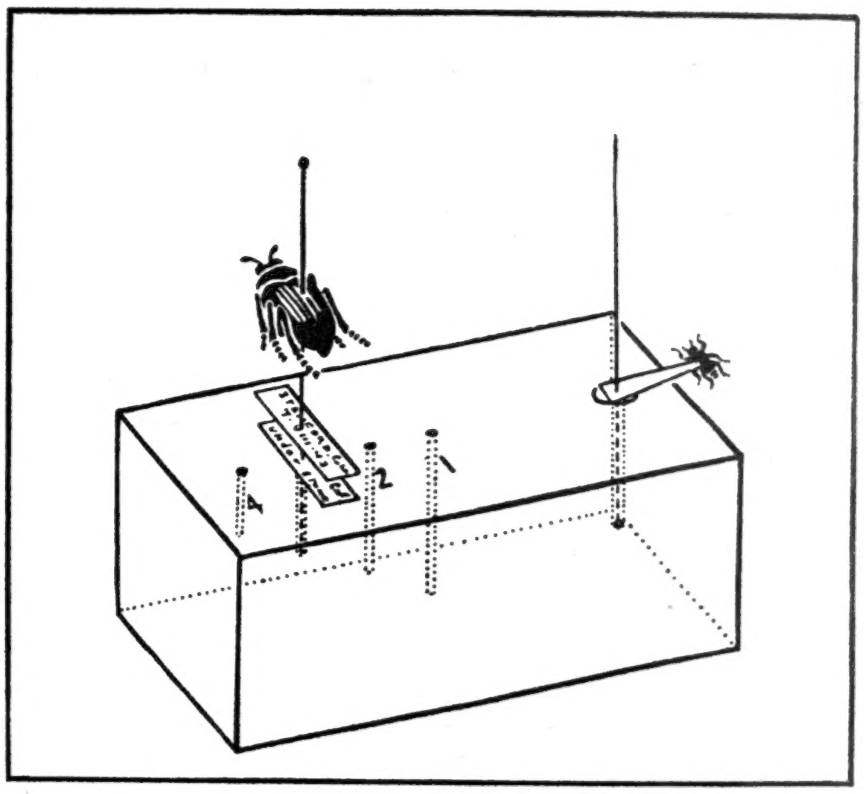

Fig. 3. A pin gage in use.

9. A pin Gage.

This is used to measure the height of specimens and labels upon pins. A handy kind of pin gage is shown in fig. 3. It is a small block of hard wood, metal, or plastic, having in its upper surface holes of various depths. At the right, distinguished by the surrounding circle, is a hole half an inch deep and big enough to admit the head of a number five pin. When a specimen has been pinned, its position is adjusted by putting the head of the pin in the bottom of this hole and pushing the insect's back down close against the surface of the block. Note that the hole is so close to the edge of the block that a point-mounted specimen projects beyond it and is not dislodged when the position of the point is determined. At the left of the block is a row of holes, ⅝", ½", ⅜" and ¼" in depth. These may be of the same diameter as the first hole, or somewhat smaller, large enough to accommodate the shaft of a number five pin. They are numbered in the order in which the labels are placed upon the pin, the highest first. As soon as the point of the pin has passed through the label it is inserted into the appropriate hole and pushed to the bottom. The label will then stand at the proper height upon the pin. Of course, you will not have to use all of these holes all

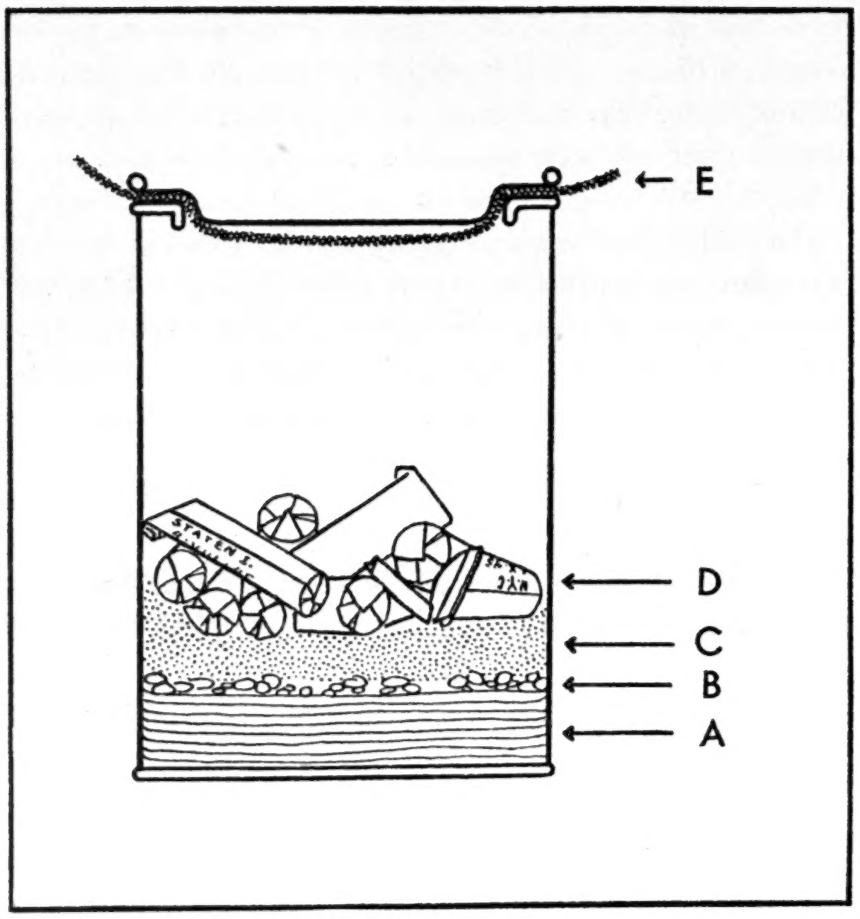

Fig. 4. Diagramatic vertical section of a relaxing box made of a tobacco tin.

A. Soaking-wet blotting paper.
B. Paradichlorobenzene moth crystals.
C. Dry Cotton.
D. Insects wrapped in paper tubes.
E. Paper towel.

of the time. When less than four labels are required, your choice of holes will be influenced by the number and nature of the labels, and by the thickness of the specimen.

10. A relaxing box.

This is a humidor used to soften specimens which have been dried for storage or to keep fresh specimens in workable condition until wanted. It is a large-mouthed, moderately shallow, watertight vessel with a close lid, large enough to contain a considerable number of insects in their storage packing if necessary. The museum relaxing boxes were made of sheet copper by a tinsmith, and measure 14" x 8" x 5". However, a tobacco tin, one pound or larger, is equally satisfactory while it lasts, and when rusted through can be easily replaced. An ice box storage jar or a small acquarium covered with a pane of glass will also do the job. In the bottom of the vessel should be about an inch and a half of some porous material capable of absorbing a great deal of water; sand, soft paper, balsa wood, plaster of paris, or a synthetic sponge, for instance. This is kept soaking wet while the box is in use. A layer of dry cotton batting about an inch thick on top of this blotter will preserve the specimens from damage through direct contact with the liquid. A tablespoonful of paradichlorobenzene moth crystals under the cotton will discourage the development of mold. Since the atmosphere inside the relaxing box is saturated, a sudden decrease in temperature will result in the condensation of water. To prevent the drops which form on the underside of the lid from falling on the specimens, upholster the lid with cloth, or place a paper towel across the mouth of the vessel before putting on the cover. Fig. 4 is a diagram of a relaxing box.

When softening specimens which have been stored between layers of cotton or wrapped in paper envelopes or tubes, do not attempt to unwrap them. Put them into the box packing and all. The relaxing box should not be filled to the top, since the moisture penetrates so great a mass slowly, and the outer specimens might fall apart before the inner ones are relaxed. However, several loose layers of wrapped specimens can safely be placed in the relaxing box at one time.

The time required to relax the specimens varies with their size, the amount and nature of the packing, and the temperature. In general, for very small or delicate species overnight will be long enough. Twenty-four hours is sufficient for most insects, but a few very large kinds may take longer, especially if the wings are to be spread as described in leaflet number 5. If it is not possible to finish mounting a box full of insects at a sitting, the remainder may usually be left over till the next day without damage, but over-long exposure will result in discoloration of some species and eventually in disintegration of the specimens.

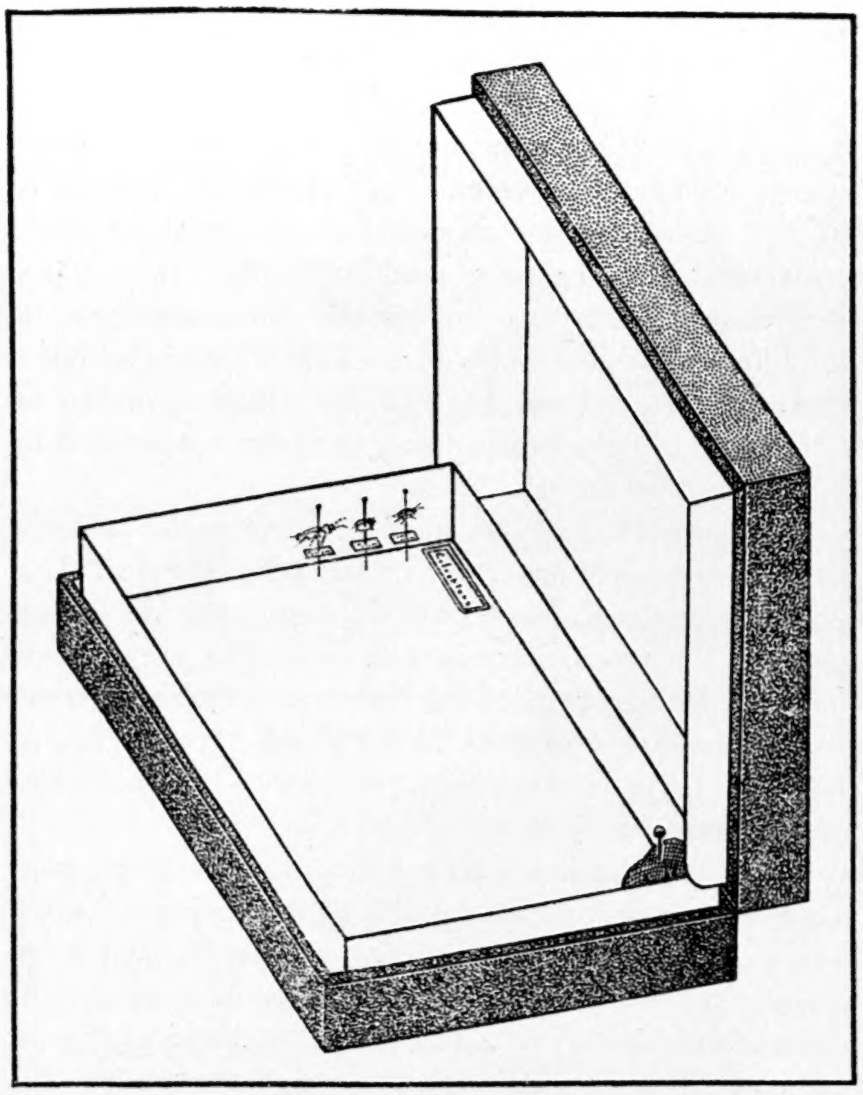

Fig. 5. A Cardboard storage box for insects.

11. Storage boxes.

Before pinning a lot of insects you must also provide storage boxes in which to place them as soon as they are mounted. Any kind of close-covered box will do, if the bottom is lined with a material soft and deep enough to receive insect pins and hold them. Museums, and a few private collectors, use large, glass-topped, cork-bottomed drawers which are kept in stacks. Wooden Schmitt boxes or cardboard storage boxes sold by supply houses are small enough to file in large library shelves. One of these appears in fig. 5. Very satisfactory, though somewhat small for Lepidoptera, are wooden cigar boxes, the kind having the top rabbeted to insure a tight closure. These may be lined with sheet cork, balsa wood, or two layers of corrugated cardboard placed at right angles to each other. The lining should be snug, and secured with glue to prevent it from being dislodged. A large number of these boxes, set on edge, can be accommodated in an ordinary bookshelf.

LABELING

Every properly pinned insect carries with it on the same pin one or more labels bearing the data relating to it. Whenever possible, these labels should be prepared in advance and placed on the pin at the same time as the specimen, thus reducing the chances of losing the information and the number of times each specimen must be handled. You might try counting or estimating the number of specimens of each date and locality when filling the relaxing box, and making the pin labels while the insects are softening.

Pin labels are best made of a good quality of light card or stiff white paper cut into strips not over three quarters of an inch wide. They should be lettered in black ink with a fine pen and in the smallest space consistent with neatness and legibility. If they are written uniformly, one below the other, close to the left hand side of the strip, with a narrow space between them, the right hand edge of the whole strip can be trimmed in one operation and the labels separated by a minimum of snips.

If your collecting has been very successful and you have hundreds of specimens with a single set of data, you might do as museums do and have the labels printed. If you collect in one place the year round, have the locality printed but leave on each label a space for the insertion of the date by hand. Four and one-half point type is of a size convenient to both collector and printer.

The information carried by the pin label must always include the locality and date of capture, and, if known, the name of the collector. In learned institutions, whose collections are built up of many private collections, labels may also bear the name of the donor. Observations on the habits and habitats of the creatures, such as "altitude 1000 meters" or "feeding on leaves of *Quercus alba*" add greatly to the value of a collection and may also be written on pin labels. The technical name of a plant host should be used, if known, but the common name is much better than none.

In order to conserve space in the storage boxes, pin labels are made as small as possible and should not project much beyond the specimen if it can be prevented. To this end, the data are abbreviated whenever this can be done without obscuring the meaning. Dates are often written as a series of numbers with dots between. The month is indicated by an unmistakable Roman numeral, to prevent confusion, since some collectors place the month first and some the day. Special care must be taken to distinguish between the Roman and Arabic "one," and between the Roman "two" and the Arabic "eleven." Thus, 1-II-'42 is the first of February, nineteen forty-two, while I-11-'42 is the eleventh of January. You may, of course, write out the date in full, if you prefer. When the identity of a specimen has been determined, its scientific name, or as much thereof as is known with certainty, may also be written on a label and placed upon the pin below the others. Several strips of pin labels appear in fig. 6.

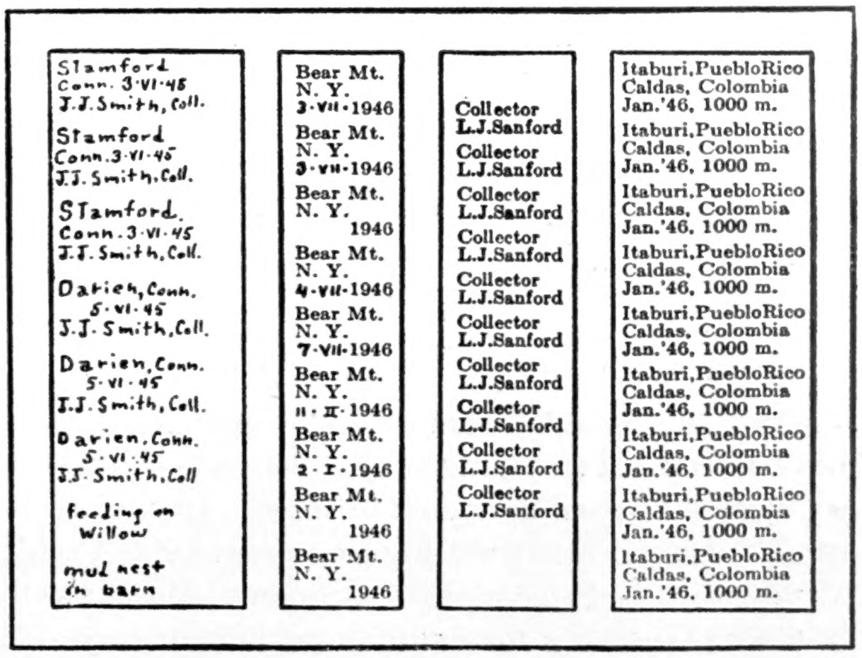

Fig. 6. Pin labels for insects, hand lettered and printed.

PINNING

With the insects properly relaxed, the labels and storage box ready, and the tools at hand, the mounting can begin. The specimens are removed from the relaxing box, not more than a few at a time, and the box closed immediately. A specimen is either held in the fingers or placed upon the pinning block, as its shape may indicate, and a pin of suitable size is passed through it from top to bottom at right angles to the length of the body. About half an inch of the pin should be left protruding above the back. In order to preserve the structure and pattern of at least half of the creature undamaged, the pin is inserted a little to the right of the middle line, and since most collectors are right handed, this facilitates all subsequent handling.

The precise point of insertion varies among the different orders, the most common being shown in fig. 7. Beetles are pinned through the right wing cover, well forward and far enough from the inner edge to prevent splitting of the elytron. Similarly, grasshoppers, cockroaches, and some other leathery-winged forms should be pinned through the right forewing, as the insect will then balance upon the pin

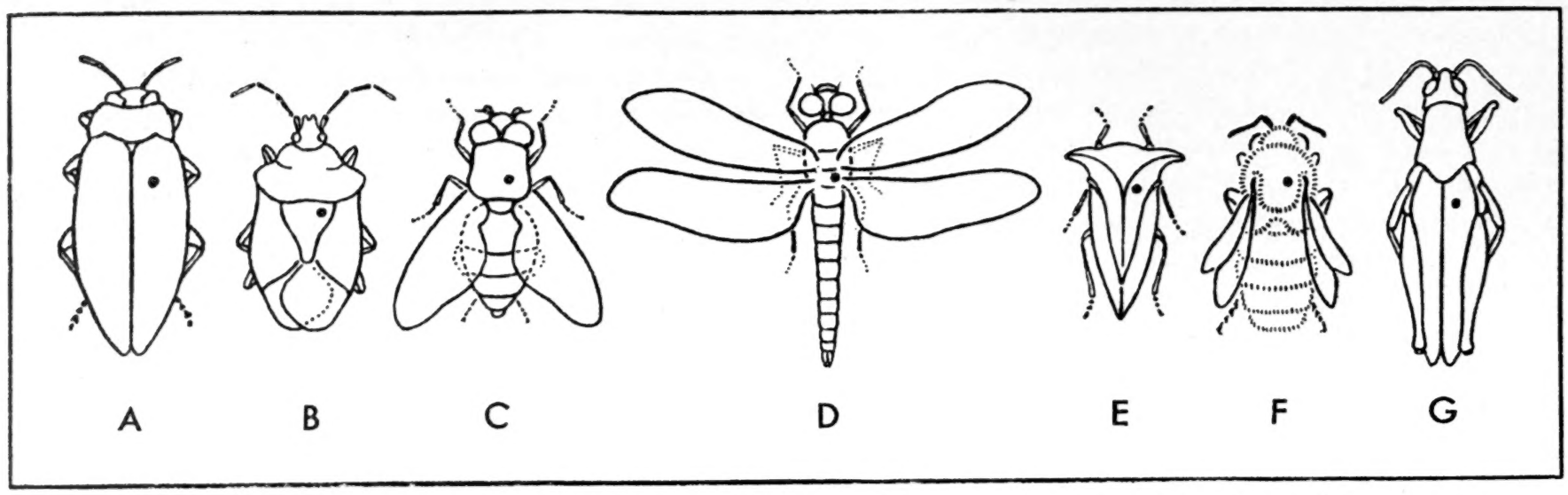

Fig. 7. Hard-bodied insects of several orders, showing where the pin should be inserted.
A. Beetle B. True Bug C. True Fly D. Dragon-fly E. Tree-hopper F. Bee G. Grasshopper

much better than it would had the traditional prothoracic position been used. In true bugs the pin is passed through the right corner of the scutellum, the triangular sclerite between the bases of the wings. Two-winged flies, tree-hoppers and cicadas, bees, and most wasps require a pin between the front wings, a little to the right. Butterflies and moths, the wings of which are commonly spread at the time of mounting, are pinned through the middle of the thorax, between the wing bases. Dragon and Damsel-flies, Stone flies, and similar forms which are frequently spread, should be pinned between the fore or hind wings as space and balance indicate. The wing-spreading operation is discussed at length in leaflet 5. If, however, through lack of time or storage space, such insects are to be mounted without spreading, they may be side-pinned. That is, the pin may be passed through the body from right to left, just below the wings. Butterflies, Damsel-flies, long-legged and large-winged wasps, and other insects having wings which project above the back sufficently to interfere with handling, are often dealt with in this fashion. Side-pinned specimens can later be relaxed, re-pinned and spread should it prove desirable. A side-pinned butterfly is shown in fig. 8.

It is important to the appearance of a collection that all the specimens stand at the same height on their pins, whenever practical. For this reason the use of a gage is recommended. The few insects which have wings or other projections rising so far above the back as to interfere with handling, if not side-pinned, may be placed low upon the pin, the top of the projection coming half an inch below the head. Some

tropical beetles are so thick that a pin will scarcely reach through them. Extra long pins are available for these, if needed; but since these insects are very durable they can usually be pushed up almost to the top of a standard pin, which will then protrude far enough at the bottom to fasten the creature into its box. All the data for such a giant should be written on one large label, pinned upside down and close against the under-

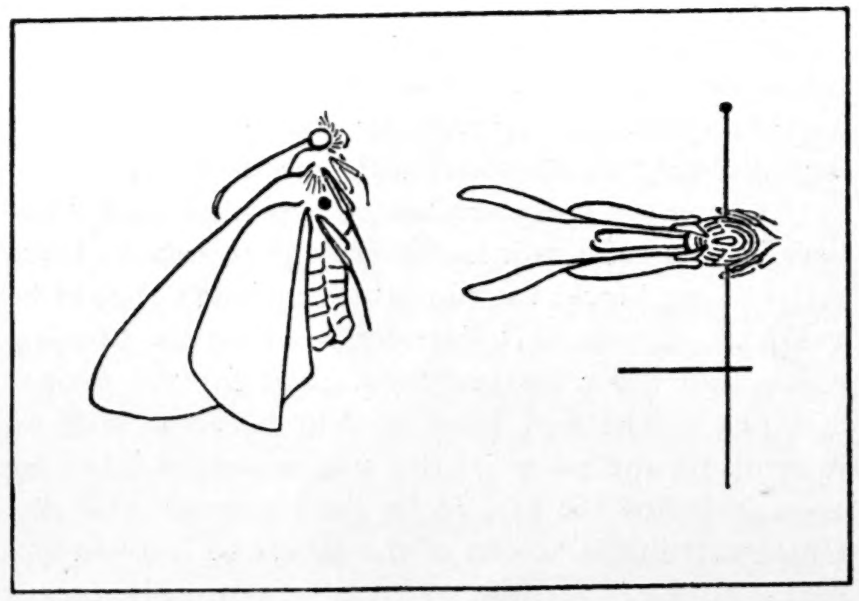

Fig. 8. A side-pinned butterfly, top and rear views.

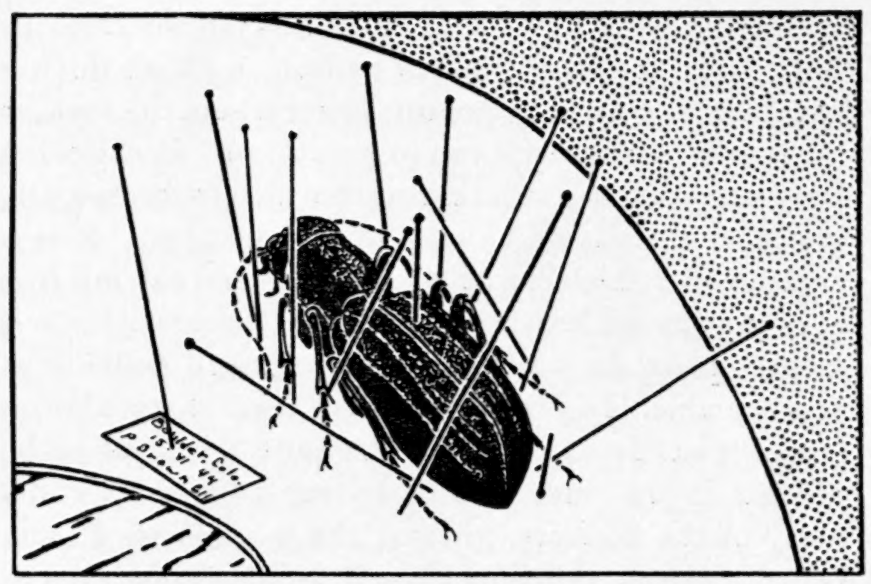

Fig. 9. Setting a beetle on the pinning block.

side of the specimen. It is read by turning the insect over.

The legs and antennae of a mounted insect should be neatly arranged, as close to the body as you can get them without hiding their characters, which are often used in making a determination. If the appendages refuse to remain in the attitude which you wish them to assume, drive the pin into the pinning block until the insect's body almost rests upon it. Then bring the appendages into position and fasten them with pins, as shown in fig. 9. If one pin does not suffice to secure a member, a pair crossed above or below it will often do so. Sagging abdomens may also be corrected by this method. The exceedingly attenuated abdomens of Dragon-flies will be more durable if each is reinforced with a fine broom straw or piece of wire. This should reach from the end of the abdomen well into the thorax. It will show least if you remove the abdomen from the body, insert the support from the thoracic end, and join the pieces by means of a little glue and the projecting end of the reinforcement thrust into the thorax. The practise of pinning Odonata is giving way, among serious students, to that of storing the specimens in individual cellophane envelopes.

Specimens which have been arranged on a pinning block should be allowed to set before they are removed. This may require several hours or several days and can be determined only by experiment.

As soon as a specimen has been pinned or, if it has been set, as soon as it is dry enough to remove from the pinning block, the pin labels or labels should be attached. To do this, lay the label on the pinning block and drive the pin through it for the proper distance. The first label should be about half an inch above the point of the pin, a second label far enough below the first to be read without difficulty. Unformity in the height of the labels adds to the appearance of a collection, and may be assured by means of a pin gage. When using such a gage, as shown in fig. 3, the specimen being a small one requiring four labels, the locality label will be placed by hole 1, the collectors label by hole 2, the observations label by hole 3 and the identity label by hole 4. With thicker specimens or those requiring fewer labels, the locality label will most often stand in position 2. In choosing the exact spot on a label through which to thrust a pin, consider the size and shape of the specimen. If it is smaller than the label, let the label extend beyond it as evenly as possible in all directions. If the specimen is larger, place the label as nearly centered under it as you are able. Insects which have been mounted with wings extended at the sides require the label to be pinned in the middle with its top edge toward the head of the creature, so that the label is read from behind. Long, thin species call for a label parallel to the body's length with the top to the insect's right, the label being read from the left. If the left wings only have been spread, as they often are in grasshoppers and some other kinds of insects, the label must be pinned near the right side and extend under the wings at the left. Small insects mounted on points as described below also require a label pinned at the right end. The objects of all this are to save space and to make the collection look neat.

POINT MOUNTING

Of the several methods devised for mounting hard-bodied species too small for pinning, the most satisfactory is to glue them onto points. These are small, narrow slips of stiff paper with an insect pin through one end and an insect at the other. To make them, use a straight strip of paper ⅜" wide, cutting it into triangles or quadrangles by a series of diagonal snips as shown in the diagram at the top of fig. 10. At the base these should not exceed ⅛" in width; at the tip they may vary from nothing to the full width of the base. A broad attachment is more secure than a narrow one and some species are roomier than others. If your catches include many small insects, make up a supply of these points in advance.

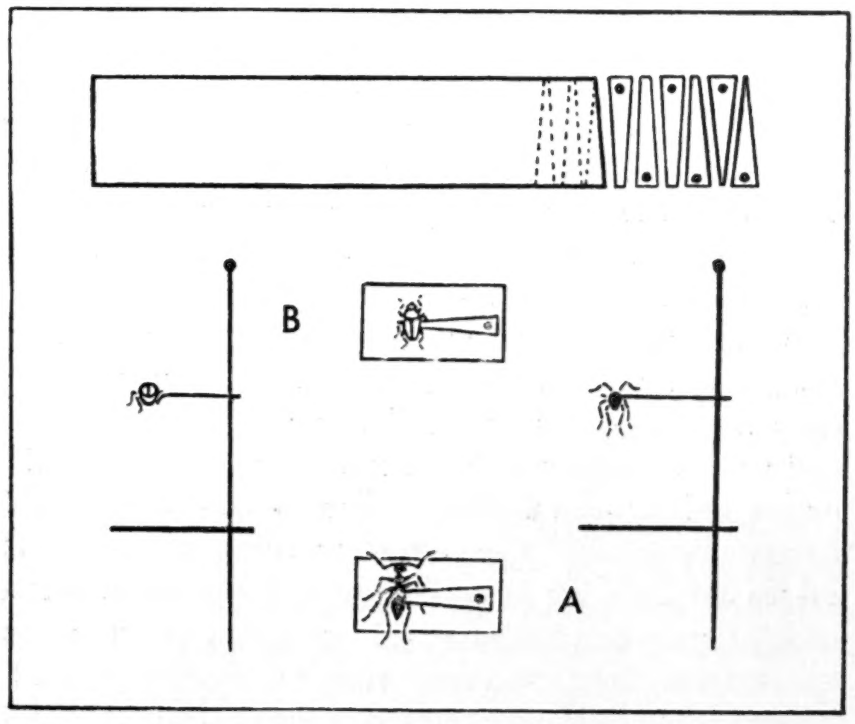

Fig. 10. The cut and use of points for mounting small insects.
A. An ant, top and rear views.
B. A beetle, top and rear views.

The point is attached to the right side of the specimen so that when the creature is headed away from you the point extends to the left of the pin. The precise manner in which the point is applied will vary with the shape of the specimen, as illustrated in fig. 11. Most beetles, like "A," are rather flat on the bottom. To mount one of these, place the relaxed specimen, bottom up and head away from you, on a pinning block or sheet of cork. Separate the second and third legs of the right side, which will be at your left, so as to leave as broad a space as possible for the attachment of the point. If the point is glued to the legs, it is likely

to come off, legs and all. Push about a quarter of an inch of the pin through the base of the point, enough to hold the pin firm in the block when the point stands level with the spot of attachment. Holding the pin in the left hand, put a very small quantity of glue on the underside of the tip of the point. With this tip directly above the spot of attachment, push the pin into the block beside the insect until the point touches it, as shown in the picture. Be sure that the specimen

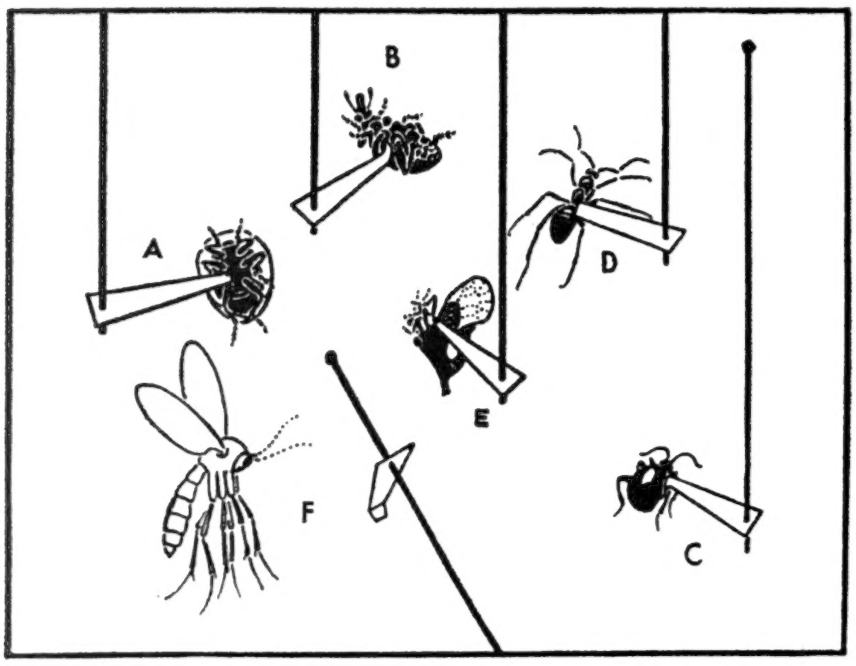

Fig. 11. Methods of applying points to insects of various shapes.

is level, with its long axis at right angles to the length of the point, and that neither the tip of the point nor the drop of adhesive extends beyond the midline of the insect. Leave pin and specimen in this position until the glue has set. Then withdraw the pin from the point, and insert it from the other side. The point should stand half an inch below the head of the pin at the end of this operation.

If a specimen is cylindrical, and offers no flat surface on the bottom for the attachment of the point, it may be treated like the weevil "B." The tip of the point is bent upwards and applied to the side of the creature between the bases of the legs. If, in mounting specimens upside down, you find the left-handed procedure inconvenient, turn the creature around with the head toward you. Its right and yours will then correspond.

A specimen so constructed that it cannot lie on its back but can stand on its feet may be handled, like the globular beetle "C," by bending the tip of the point downward and applying it to the right side of the creature above the bases of the legs. If it will make the point fit better, the bending may be done diagonally as shown.

Ants like "D" require a very broad point attached to both thorax and abdomen, bridging the weak place at the waist. Since the abdomen is broader than the thorax, the specimen will stand at right angles to the point with less trouble if the tip of the point is clipped off or bent under a little at the back. This also appears in the picture.

"E" is a Membracid or Tree-hopper. Members of this family are compressed laterally, and have important characters on the ventral surface. It is therefore convenient to mount them as shown. When inverted the specimen will lie horizontally on top of the point with the feet stretched out to the left. It is equally acceptable, but more troublesome, to mount Membracids in the same way as illustrated for the fly, "F," the method used for most laterally compressed species. The specimen is shown lying on its left side. The point, with the tip bent down, is already in its final position near the top of the pin. The tip, which has a little glue on the outer surface, will be pressed against the right side of the insect just under the wing. The disadvantage of this method is that the pin must be held in the fingers until the glue has set sufficiently to keep the specimen in place. It is, however, the only practical method for insects which will neither lie on their backs nor stand on their feet. "F," when mounted, will be in a vertical position, wings up, feet down.

When mounting insects on points, remember the label, pinned near the middle of the right hand edge and read from behind. Completed point-mounted specimens should look like those shown at the bottom of fig. 10.

STORAGE

As soon as an insect is mounted, pin it into a storage box to keep it safe from dust and damage. If you are making a large general collection, you may want to sort your specimens as you go and use a separate box for each group. When the boxes are full, or the day's work finished, leave the open boxes in a warm, dry, mouse-proof place for several days so that the specimens may dry rapidly. Slow drying causes discoloration of some specimens. A few very heavy-bodied creatures, notably large grasshoppers, are so difficult in this respect that they may have to be eviscerated through a ventral incision while fresh, and stuffed with cotton, if the color is to be preserved.

When the specimens are dry, put into each box, before storing it away, a teaspoonful of paradichlorobenzene, as a precaution against mould and the attack of Dermestids and other entomophagous beetles. If the boxes are to be filed on edge, tie up the crystals in a piece of loose-woven cloth and pin it into a corner of the box. This will prevent the crystals from breaking the specimens as they shift position every time the box is moved.